

FIG. 1  
(PRIOR ART)

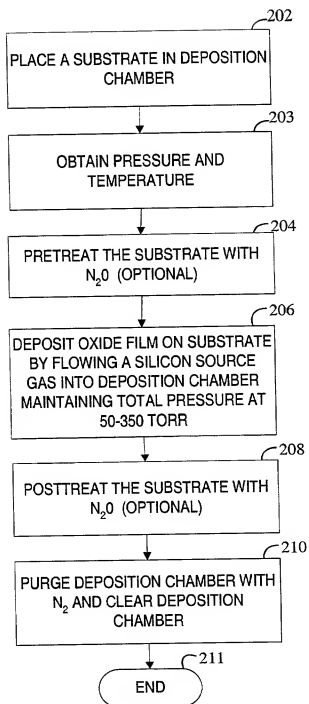


FIG. 2

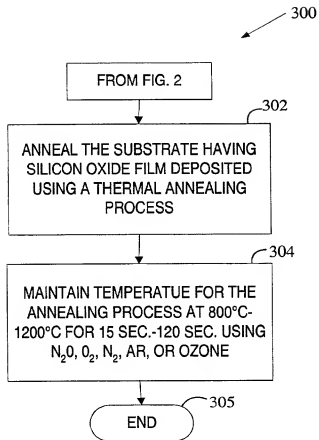


FIG. 3

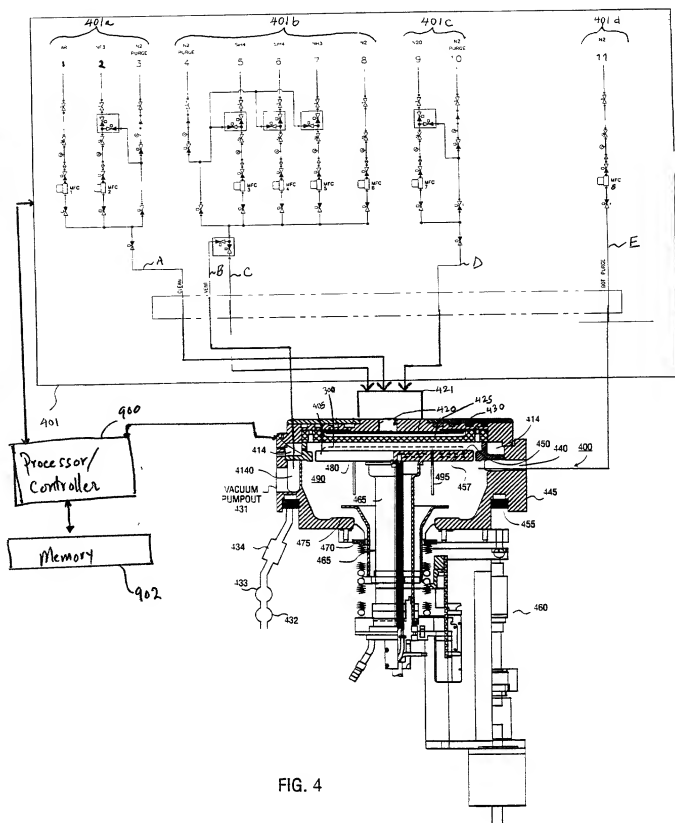


FIG. 4

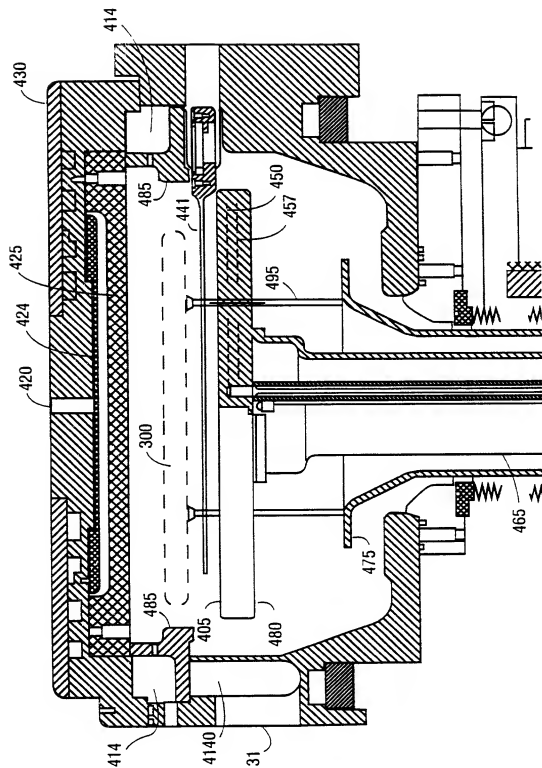


FIG. 5

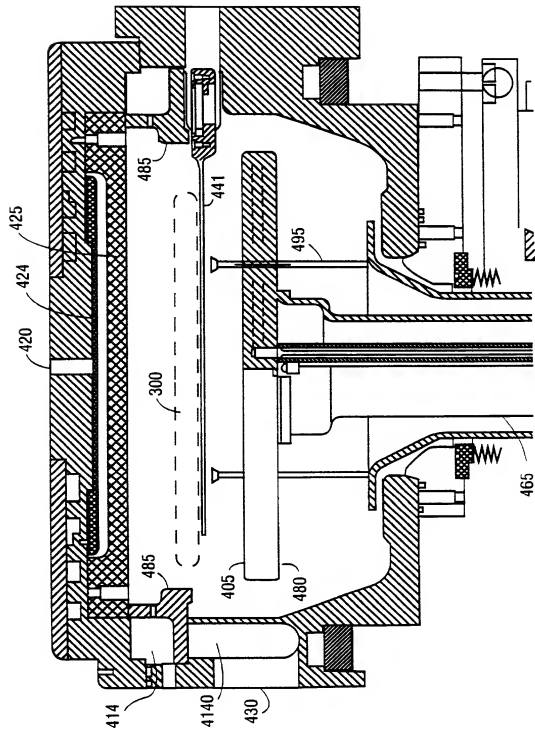


FIG. 6

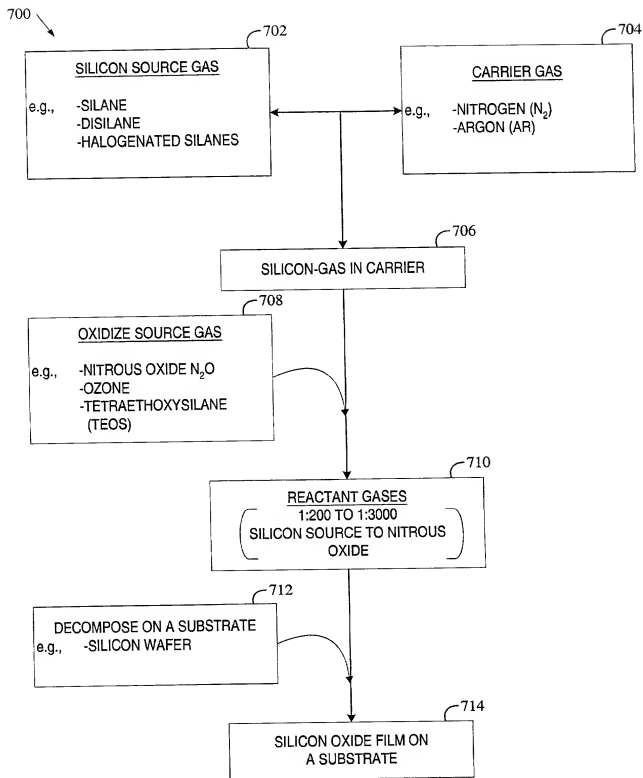


FIG. 7

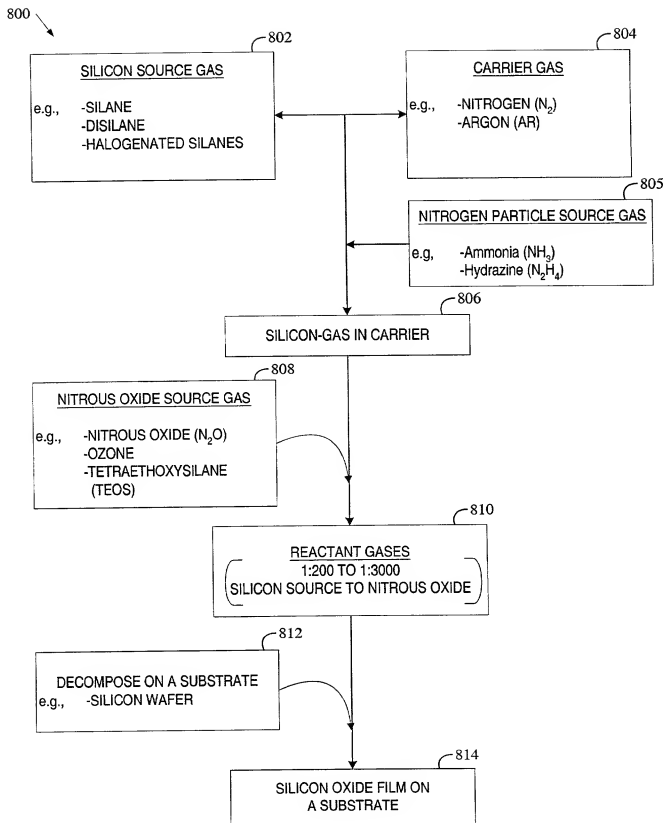


FIG. 8



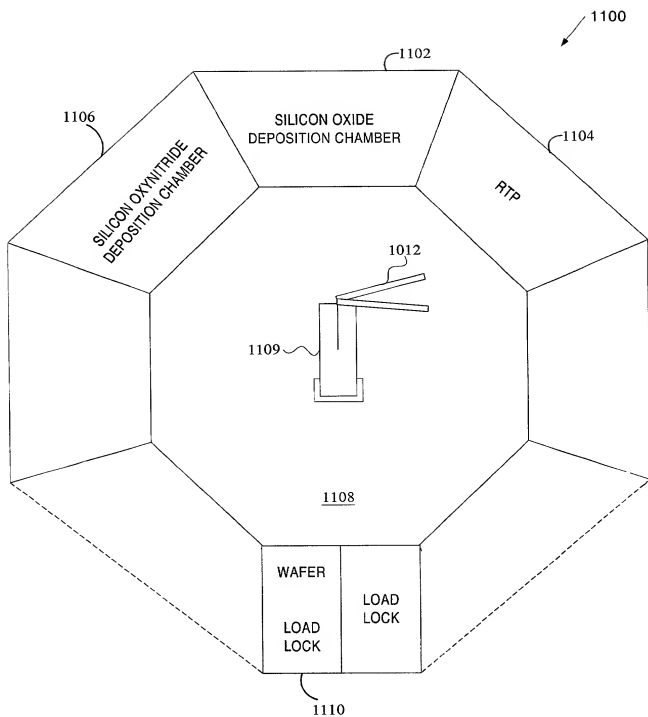


FIG. 9

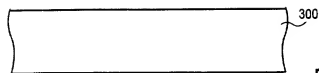


FIG. 10A

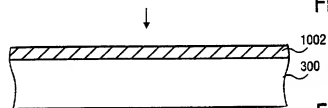


FIG. 10B

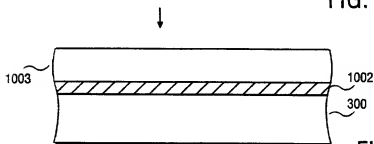


FIG. 10C

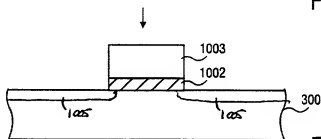


FIG. 10D

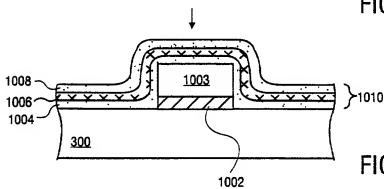


FIG. 10E

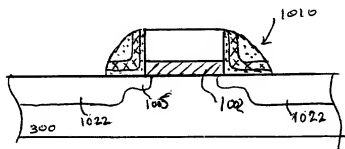


FIG. 10F

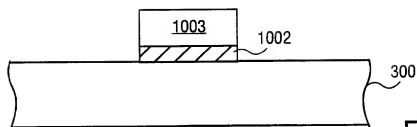


FIG. 10G

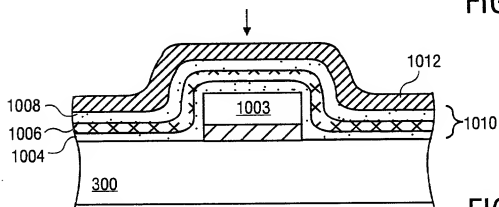


FIG. 10H

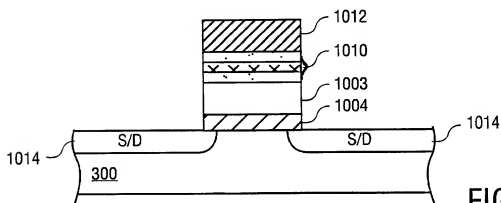
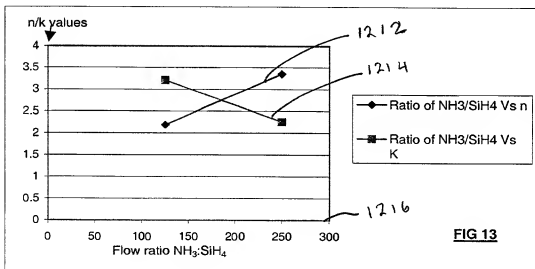
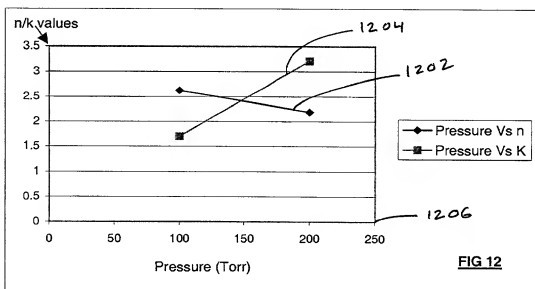
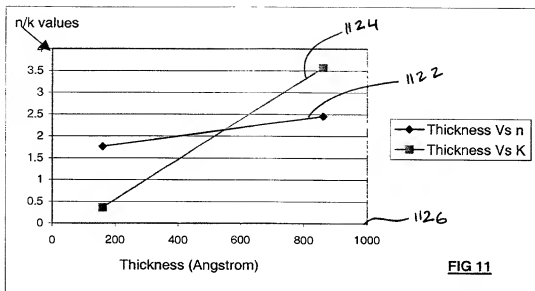


FIG. 10I



# Step Coverage vs N2O/SiH4 ratio

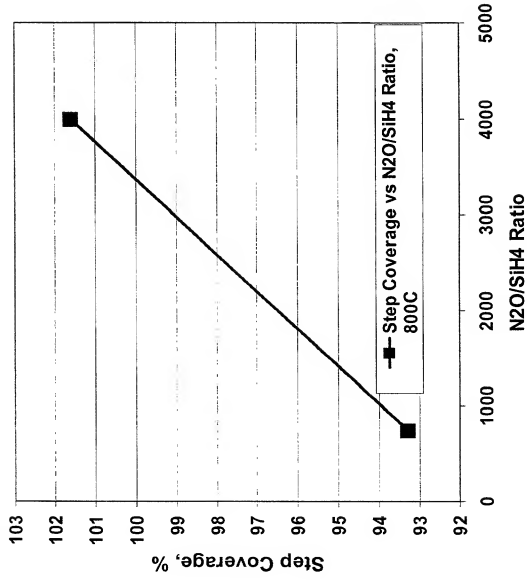


FIG. 14

# Step Coverage vs Temperature

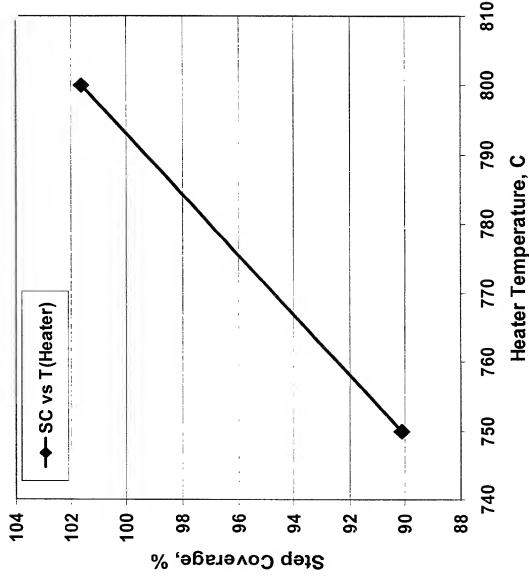


FIG. 15

|   |  |                    |                    |                    |                    |
|---|--|--------------------|--------------------|--------------------|--------------------|
| 1 |  | 60Å                | 70Å                | 150Å               | 1000Å              |
| 2 |  | Silicon oxide film | Silicon oxide film | Silicon oxide film | Silicon oxide film |
|   | <b>Pretreatment</b>  |                    |                    |                    |                    |
|   | Time   | 10 seconds         | 10 seconds         | 10 seconds         | 10 seconds         |
|   | Temperature  | 750 °C             | 800 °C             | 700 °C             | 800 °C             |
|   | Pressure   | 200 Torr           | 200 Torr           | 200 Torr           | 200 Torr           |
|   | N <sub>2</sub> O into chamber                                  | 500 sccm           | 1200 sccm          | 1500 sccm          | 4000 sccm          |
|   | SiH <sub>4</sub> divert line                                   | 1 sccm             | 2 sccm             | 2 sccm             | 20 sccm            |
|   | SiH <sub>4</sub> into chamber                                  | 0 sccm             | 0 sccm             | 0 sccm             | 0 sccm             |
|   | N <sub>2</sub> into chamber<br>(carrier for SiH <sub>4</sub> ) | 5000 sccm          | 10000 sccm         | 5000 sccm          | 10000 sccm         |
|   | N <sub>2</sub> into bottom<br>chamber                          | 4000 sccm          | 8000 sccm          | 4000 sccm          | 8000 sccm          |
| 3 | <b>Deposition</b>  |                    |                    |                    |                    |
|   | Time   | 40 seconds         | 44 seconds         | 53.2 seconds       | 75 seconds         |
|   | Temperature  | 750 °C             | 800 °C             | 750 °C             | 750 °C             |
|   | Pressure   | 200 Torr           | 200 Torr           | 200 Torr           | 200 Torr           |
|   | N <sub>2</sub> O into chamber                                  | 500 sccm           | 1200 sccm          | 1500 sccm          | 4000 sccm          |
|   | SiH <sub>4</sub> divert line                                   | 0 sccm             | 0 sccm             | 0 sccm             | 0 sccm             |
|   | SiH <sub>4</sub> into chamber                                  | 1 sccm             | 2 sccm             | 2 sccm             | 20 sccm            |
|   | N <sub>2</sub> into chamber<br>(carrier for SiH <sub>4</sub> ) | 5000 sccm          | 10000 sccm         | 5000 sccm          | 10000 sccm         |
|   | N <sub>2</sub> into bottom<br>chamber                          | 4000 sccm          | 8000 sccm          | 4000 sccm          | 8000 sccm          |
| 4 | <b>Posttreatment</b>   |                    |                    |                    |                    |
|   | Time   | 10 seconds         | 10 seconds         | 10 seconds         | 10 seconds         |
|   | Temperature  | 750 °C             | 800 °C             | 750 °C             | 750 °C             |
|   | Pressure   | 200 Torr           | 200 Torr           | 200 Torr           | 200 Torr           |
|   | N <sub>2</sub> O into chamber                                  | 500 sccm           | 1200 sccm          | 1500 sccm          | 4000 sccm          |
|   | SiH <sub>4</sub> divert line                                   | 0 sccm             | 2 sccm             | 0 sccm             | 0 sccm             |
|   | SiH <sub>4</sub> into chamber                                  | 0 sccm             | 0 sccm             | 0 sccm             | 0 sccm             |
|   | N <sub>2</sub> into chamber<br>(carrier for SiH <sub>4</sub> ) | 5000 sccm          | 10000 sccm         | 5000 sccm          | 10000 sccm         |
|   | N <sub>2</sub> into bottom<br>chamber                          | 4000 sccm          | 8000 sccm          | 4000 sccm          | 8000 sccm          |
| 5 | <b>Purge</b>   |                    |                    |                    |                    |
|   | Time   | 10 seconds         | 10 seconds         | 10 seconds         | 10 seconds         |
|   | N <sub>2</sub> into chamber<br>(carrier for SiH <sub>4</sub> ) | 5000 sccm          | 10000 sccm         | 5000 sccm          | 10000 sccm         |
|   | N <sub>2</sub> into bottom<br>chamber                          | 4000 sccm          | 8000 sccm          | 4000 sccm          | 8000 sccm          |

TABLE 1: PARAMETERS FOR MAKING SILICON OXIDE FILMS